

**FILM CONTAINING PULLULAN BLENDED THEREIN FOR CAPSULE AND CAPSULE**

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**Abstract of JP5065222**

**PURPOSE:** To obtain a soft capsule, capable of stably enclosing a readily oxidizable substance, exhibiting easy solubility and withstanding a production method according to a punching method by blending a capsule film substrate such as gelatin, agar or carrageenan with pullulan.

**CONSTITUTION:** A film containing pullulan (natural neutral polysaccharides which contain maltotriose that is a trimer of glucose repeatedly bound through alpha-1,6-glucoside bonds and are useful as a food) blended therein for a capsule is obtained by blending a capsule film substrate such as gelatin, agar or carrageenan with the pullulan in an amount of about 5-10% based on the total weight of the film. A readily oxidizable substance such as eicosapentaenoic acid, docosahexaenoic acid or beta-carotene can stably be contained by using the film containing the blended therein to afford the capsule. The resultant capsule is excellent in solubility in the stomach and capable of rapidly exhibiting effect of the medicine. Even if a soft capsule is produced by a punching method such as a flat plate or rotary die, the bonded surface is firm and there is no fear of leaking liquid contents and breaking the bonded surface, etc., with time.

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[JP,05-065222,A]

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**CLAIMS**

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[Claim(s)]

[Claim 1] The pullulan combination coat for capsules characterized by blending a pullulan with a coat basis [claim 2] The capsule which wrapped the contents of the easy-oxidizable matter entirely by the pullulan combination coat [claim 3] The easy solubility capsule which wrapped contents entirely by the pullulan combination coat [claim 4] The elastic capsule which has the firm adhesion side which is the capsule which wrapped contents entirely by the pullulan combination coat, and manufactured by the punching method

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the pullulan combination coat for capsules and capsule for the elastic capsule or hard capsules used for drugs, health food, cosmetics, etc.

[0002]

[Description of the Prior Art] Generally, the coat of an elastic capsule or hard capsules is formed from water-soluble film forming agent components, such as gelatin, an agar, and a carrageenan. And by the soft capsule coat which gelled and obtained the coat basis

which consists of gelatin, water, and a plasticizer, an elastic capsule wraps contents entirely and is manufactured. Moreover, hard capsules are manufactured by being filled up with contents in the hard filled capsule coat fabricated by making for example, a gelatin water solution adhere to the circumference of a mold, and drying it.

[0003]

[Problem(s) to be Solved by the Invention] There is a technical problem like the following in the above-mentioned conventional coat for capsules.

(1) An IKOSAPENTO acid (it calls for short Following EPA), docosa-hexaenoic acid (it calls for short Following DHA), or beta carotene said for there to be effectiveness in prevention of an adult disease etc. generally is matter which is very easy to oxidize from all having many double bonds in the intramolecular. And since it has a characteristic different taste and a nasty smell, matter, such as this, cannot be blended with common food in a form as it is. Then, it is used as health food generally enclosed with the elastic capsule. Moreover, after enclosing with an elastic capsule, the approach of adding for food is also well-known. (JP,60-102138,A, JP,60-66935,B, JP,2-203741,A) However, although the different taste and a nasty smell could be covered by approaches, such as this, oxidation of contents could not be prevented completely but there was a problem on which the peroxide number rises with time.

(2) Generally the capsule used for drugs or health food has good solubility after intake and within the stomach, and since making the drug effect which contents have discover promptly is required, it is the important technical problem of a capsule originally to raise the solubility of a capsule.

(3) In order to manufacture an elastic capsule by blanking methods, such as a monotonous type and rotary die type, pressing contents fit between the soft capsule coats of two sheets which gelled and obtained the coat basis which consists of gelatin, water, and a plasticizer, by \*\*\*\*(ing) with metal mold, paste up a coat comrade and fabricate. Raising the adhesive property of the coat at this time raises the stability of an elastic capsule with time. That is, it is the important technical problem of an elastic capsule in the semantics which prevents the liquid spill of contents, the crack of an adhesion side, etc. A deer is carried out and it aims at offer of a capsule the rise of the peroxide number with time made the matter with which EPA, DHA, beta carotene, etc. tend [ very ] to oxidize enclose [ offer ] with stability few in this invention. Moreover, solubility of this invention is good and it aims at offer of the capsule which may discover promptly the drug effect which contents have. Furthermore, this invention aims at offer of the elastic capsule which strengthens the adhesion side of an elastic capsule which manufactures by the punching method, and does not have the liquid spill of contents with time, the crack of an adhesion side, etc.

[0004]

[Means for Solving the Problem] this invention persons blend a pullulan with capsule coat bases, such as gelatin, an agar, and a carrageenan, paying attention to various properties which a pullulan has. It is natural neutral polysaccharide which the maltotriose whose pullulan is the trimer of a glucose combined here repeatedly by alpha-1 and 6 glycoside linkages, and is approved as food without a use limit like starch in our country. In this invention, what is generally marketed, for example under the name of [ Business affairs / Hayashibara ] "pullulan PF-20" can be used.

[0005] Although the loadings to the above mentioned capsule coat basis of a pullulan do

not have especially a limit, opacification of a capsule coat and disappearance of the luster on the front face of a capsule advance, so that the loadings are increased. therefore -- desirable -- coat AUW [ of the capsule after manufacture / 1% of ] - it is 5% - 10% especially preferably 15%. When fewer than 1%, if effectiveness is not fully discovered but it is 15% or more also in which purpose of this invention, opacification of a capsule coat and disappearance of the luster on the front face of a capsule are remarkable. However, the manifestation of effectiveness appears notably, so that there are many loadings of a pullulan also in which purpose of this invention.

[0006] It does not need but, as for a means special to preparing the pullulan combination coat for capsules and capsule of this invention, an elastic capsule 1 and hard capsules can use the coat liquid brewing approach of a conventional method, and the capsule manufacture approach. Moreover, in the purpose which prevents oxidation of the contents 2 of a capsule among this inventions, the approach of coating with the water solution of a pullulan about the capsule which enclosed the oxidizable material by the usual coat formula is also effective.

[0007]

[Example] The pullulan 10 weight section was blended with the coat basis which consists of the gelatin 100 weight section, the glycerol 30 weight section, and the water 100 weight section as a coat formula. The elastic capsule 1 of oval 5 mold (OVAL5 mold) was manufactured from this compound coat according to the rotary die type manufacturing method of the blanking method which is one of the processes of an elastic capsule 1. "Pullulan PF-20" of Hayashibara Business affairs was used for the pullulan. Moreover, contents liquid 2 is purification sardine oil (12.5% of peroxide-number 0.1(meq/kg) (milliequivalent/kg) EPA contents and 10.5% of DHA contents were used.).

[0008] (Example of a comparison) the coat basis which consists of the gelatin 100 weight section, the glycerol 30 weight section, and the water 100 weight section as a coat formula -- the same process as the above-mentioned -- the elastic capsule was manufactured with the same contents liquid. In short, the pullulan is not blended.

[0009] (Experiment 1) The peroxide number was measured and it compared with the value before preservation, after taking 50 capsules into the No. 6 sample bottle about the elastic capsule of said example and said example of a comparison and saving for one week in the state of unstopping at each 40-degree C thermostat. It is shown in Table 1.

[0010]

[Table 1]

[0011] The elastic capsule of an example was excellent in the point with few rises of the peroxide number of contents with the above mentioned table 1 compared with the elastic capsule of the example of a comparison.

[0012] (Experiment 2) Six every capsules each of disintegration tests of a Japanese pharmacopoeia convention were performed about the elastic capsule of said example and said example of a comparison. The result is shown in Table 2.

[0013]

[Table 2]

[0014] The elastic capsule of an example had decay time shorter than the above mentioned table 2 compared with the elastic capsule of the example of a comparison, and solubility was excellent.

[0015] (Experiment 3) the core of the elastic capsule of said example and said example of a comparison is shown in drawing 1 -- as -- cutting -- a stereoscopic microscope -- A-D -- the thickness of each part was measured. However, A and B show jointing and C and D show the coat section. The measurement result is shown in Table 3.

[0016]

[Table 3]

[0017] compared with the elastic capsule of the example of a comparison, the thickness of the coat section of the elastic capsule of an example boils [ markedly ] the thickness of jointing with an abbreviation EQC and was thicker than said table 3 carried out. This has suggested that the elastic capsule of an example has little possibility that the leakage of the contents liquid of the place where an adhesive agent originates compared with the elastic capsule of the example of a comparison with time, the crack of a capsule, etc. will arise.

[0018]

[Effect of the Invention] (1) In this invention, the capsule which the rise of the peroxide number with time made enclose EPA, DHA, and easy-oxidizable matter like beta carotene with stability few can be obtained.

(2) Solubility is good and the capsule which may discover promptly the drug effect which contents have can be obtained.

(3) The adhesion side of an elastic capsule which manufactures by the punching method can be strengthened, and an elastic capsule without the liquid spill of contents with time, the crack of an adhesion side, etc. can be obtained.

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